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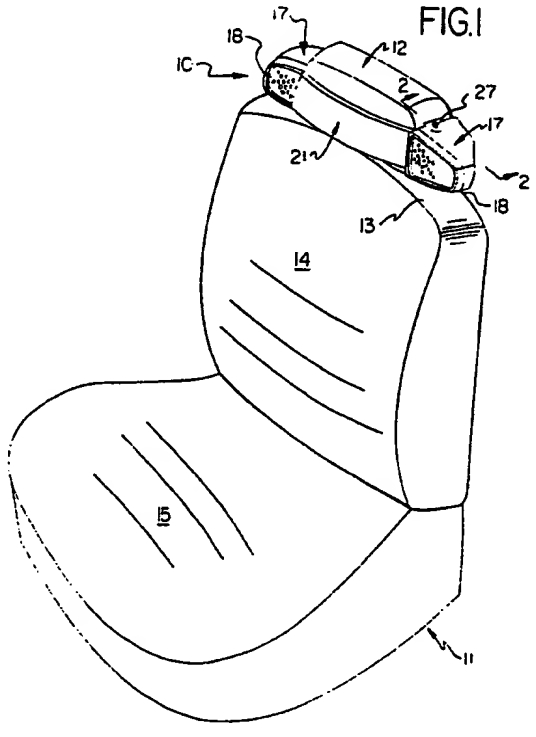
(54) **Speaker assembly**

(57) A speaker assembly comprises two speaker units 17 that are mounted on a vehicle seat headrest 12 by means of respective generally U-shaped supports fitted around opposite side edges of the headrest 12 and clamped in place by an elongated, flexible and elastic belt 21 having overlapping ends secured together by hook-and-loop fasteners. The outer side of the belt is covered with the "loop" fasteners, and a short extension of the belt has hook fasteners on its inner side. The belt 21 extends through gaps between the supports and two speaker housings 17 that are hinged on the supports, the hinges providing frictional resistance for holding each speaker in a selected angular position.

FIG.1



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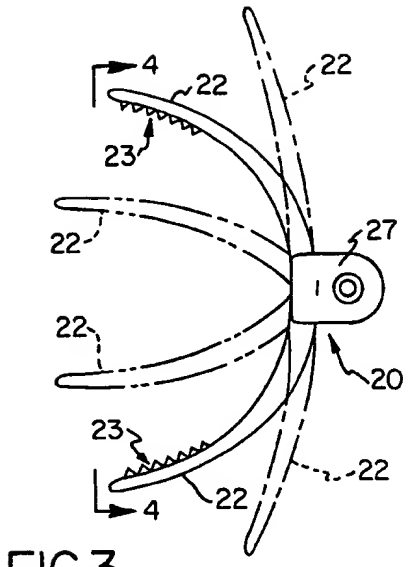

FIG.3

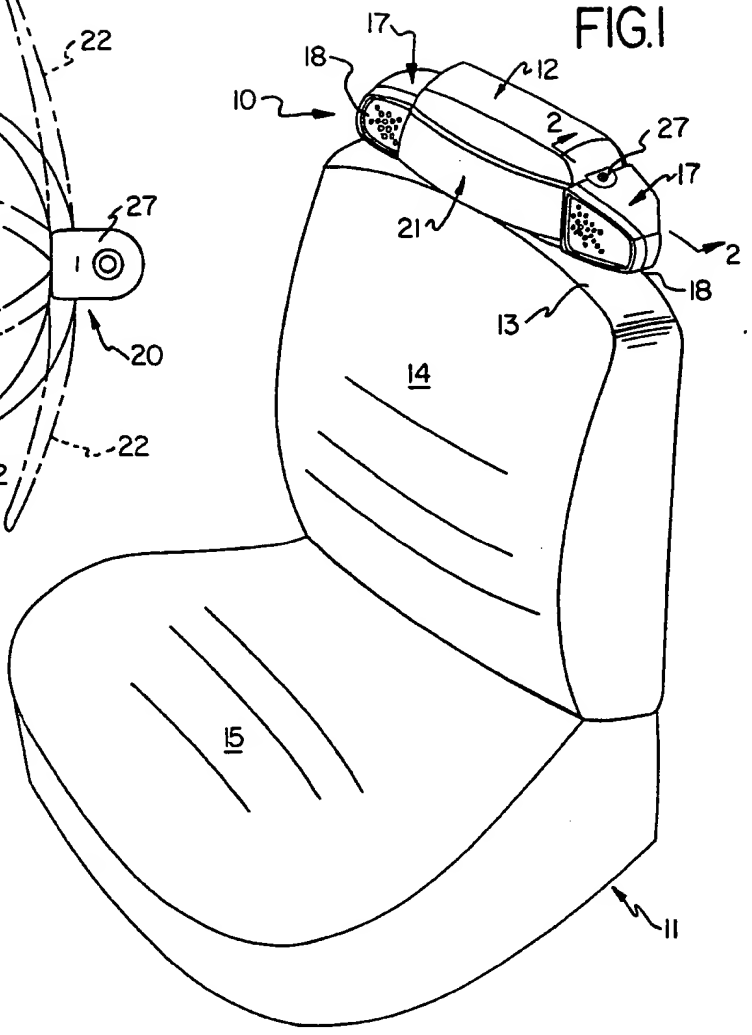

FIG.1

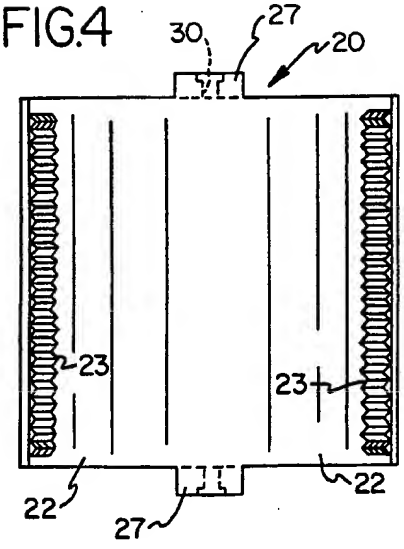

FIG.4

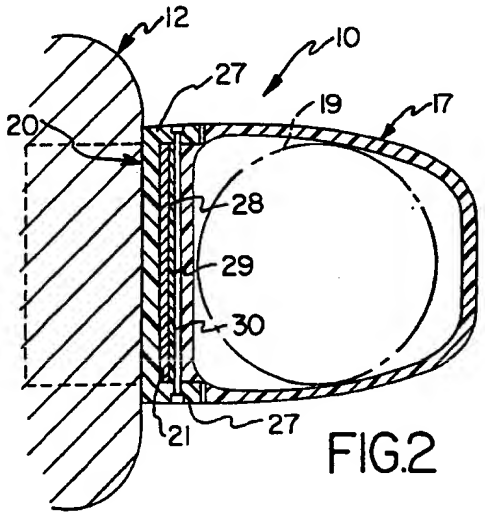

FIG.2

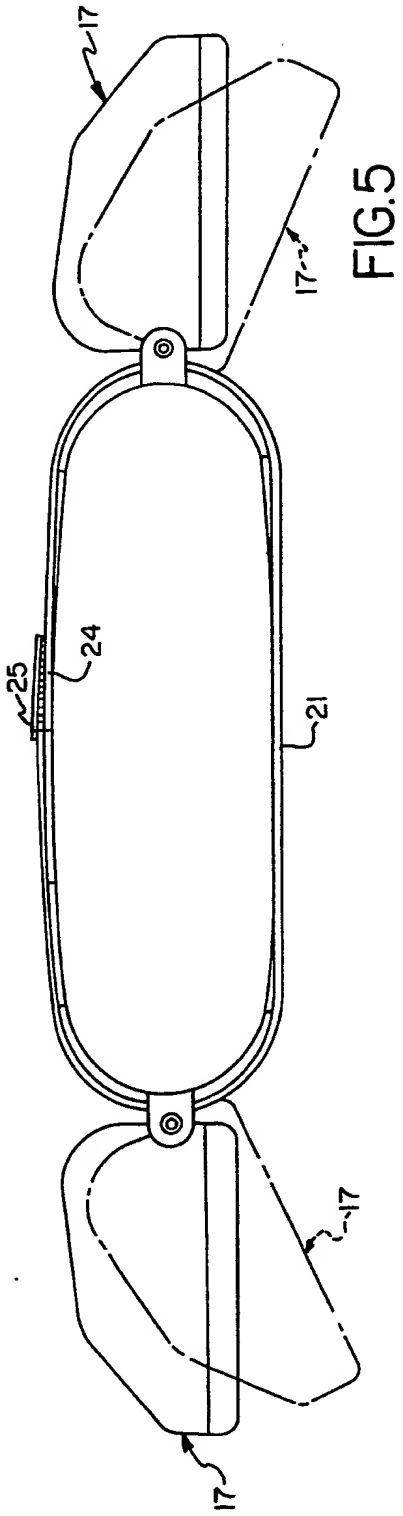

FIG.5

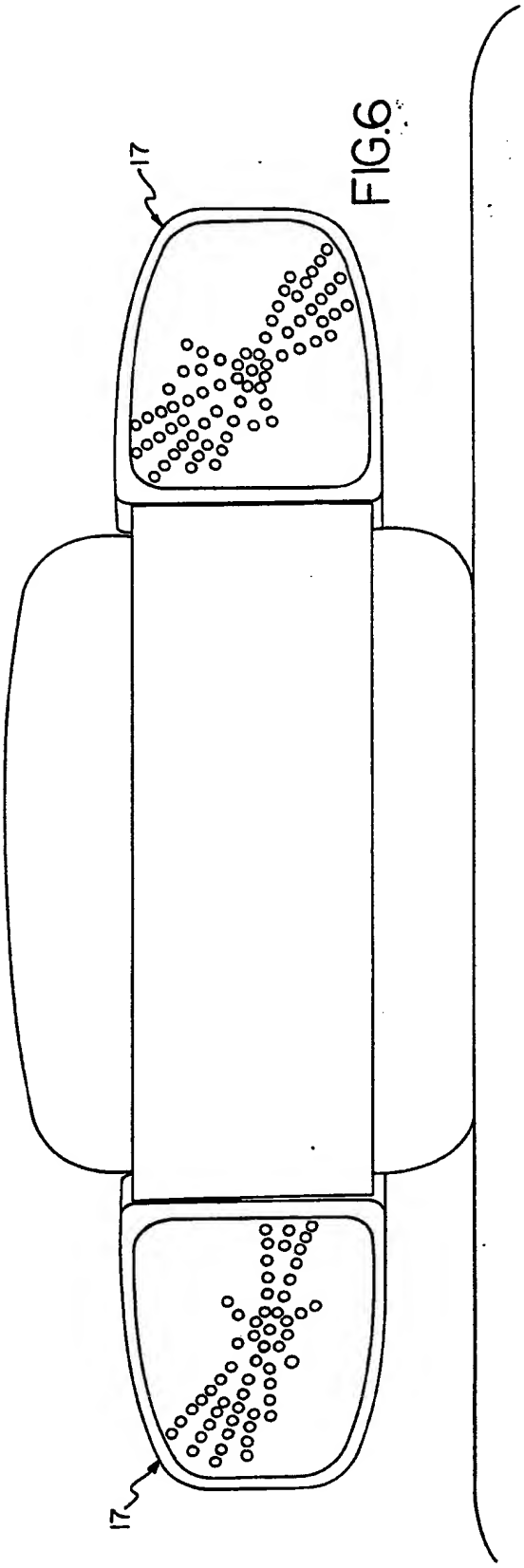

FIG.6

PATENTS ACT 1977
Agent's Reference: P5547GB-H/JCC/ac

DESCRIPTION OF INVENTION

Title: "Speaker assembly"

THIS INVENTION relates to a speaker assembly for use in an automobile or other vehicle.

In the past, numerous different types of speaker systems have been proposed for use on seats for automobiles or aircraft. Among these are speakers built into headrests for installation on seats, as in U.S. Patents Nos. 4638884, 4490842, 4042791, 3944020 and others, and special seatback mountings such as the post-mounted crossbar mounting shown in U.S. Patent No. 3976162. For various reasons, including complexity of construction, awkwardness, and difficulty of installation, these prior systems have not met with success or found general commercial acceptance.

An object of the present invention is to provide an improved and simplified speaker assembly that overcomes the deficiencies of the prior systems.

According to the invention, there is provided a speaker assembly mountable on an upright seat or the like, comprising: two speaker units each comprising a speaker housing, a speaker support positionable along one side edge of the seat, and hinge means pivotally mounting each speaker housing on the support; a flexible belt joining said speaker units together and adjustable in length to adjust the spacing of the speaker units to the width of the seat; and gripping means on said speaker supports for cooperating with said belt to hold the speaker housing at a selected level on the seat.

A speaker assembly embodying the invention is mountable on the back of a seat in the vehicle, whereby the two speakers can be positioned to lie on opposite sides of the head of a person sitting in the seat. With a seat having a headrest as part of the seat back, the assembly is preferably mounted on the headrest.

A speaker assembly embodying the invention is mountable on an upright vehicle seat back with the speaker supports engaged with opposite side edges of the seat back, either with the main portion of the seat back or with a headrest projecting upwardly from the main portion, so that the two speaker housings can be positioned to lie on opposite sides of the head of a person sitting in the seat. The pivotal mounting of the speaker housings on the speaker supports permits individual angular adjustment, and the flexible belt which extends around both of the speaker supports and is tightenable around the seat back or head rest serves to clamp the supports into tight, gripping engagement with the seatback, thereby to hold the speaker housings at a selected level on the seat back.

The mounting belt, in the preferred embodiment, has free end portions for overlapping behind the seat back and has hook-and-loop fasteners on the adjacent sides of the overlapping portions, and the speaker supports are U-shaped members having resiliently flexible free end portions which are clamped by the belt into firm engagement with the seat back, the arms having gripping teeth on their inner sides. The speaker housings are preferably pivoted on the supports by hinge means forming gaps through which the belt extends, the hinge means being formed to provide frictional resistance to pivoting of the speaker housings, thereby to hold them releasably in each selected position.

With this basic arrangement, there is provided a speaker assembly that is very simple to mount on a seat

back, yet holds the speaker housings securely at any desired level along the back, in a manner that is neat and unobtrusive in appearance.

An embodiment of the invention is described below with reference to the accompanying drawings, wherein:-

FIGURE 1 is a perspective view of a vehicle seat that is equipped with a speaker assembly in accordance with the present invention, shown mounted on a headrest that is part of the back of the vehicle seat;

FIGURE 2 is an enlarged fragmentary cross-sectional view taken along line 2-2 of Figure 1;

FIGURE 3 is a top view of a speaker support, shown in part in Figure 2, with alternative flexed positions of the legs of the support shown in broken lines;

FIGURE 4 is a side elevational view of the speaker support in Figure 3, taken in the direction of the arrows 4-4 in Figure 3;

FIGURE 5 is an enlarged, partial top plan view of the speaker assembly and headrest of Figure 1, with alternative angular positions of the speaker housings shown in broken lines, and

FIGURE 6 is an enlarged partial front elevational view of the speaker assembly, headrest and seat back of Figure 1.

As shown in the drawings for purposes of illustration, the invention is embodied in a speaker assembly, indicated generally by the reference number 10 in Figures 1, 5, and 6, that is mounted on a vehicle seat 11, and specifically on a headrest 12 that projects upwardly from the upper edge 13 of the back 14 of the seat in a conventional manner, forming an upward extension of the seat back, such extension being provided primarily for safety reasons. The seat has the usual lower portion 15 for a person (not shown) to sit on, as he or she leans against the main portion 14 of the seat back, with his or her head in front of the headrest 12.

To provide sound from both sides of the head, for a stereo effect, the speaker assembly includes two speaker

housings 17, which may be of similar construction, with perforated grilles 18 on their forward-facing sides, adjacent the ears of the user. Each speaker housing encloses a speaker 19, which may be of conventional construction and is shown herein simply as a broken-line circle in Figure 2. Each speaker is connected to the vehicle's sound system by connectors (not shown) which preferably extend downwardly from the rear sides of the speaker housings along the rear side of the seat back 14.

Each speaker housing 17 is supported on the seat back 14 by a U-shaped speaker support 20 that fits snugly around a side edge of the seat back, herein an edge of the headrest 12 as shown in Figure 1, and is held in place by an elongated flexible belt 21 which extends around both speaker supports and is adjustably tightened around the headrest to clamp the supports into tight gripping engagement with the headrest. The speaker supports have resiliently flexible legs 22 that are pressed by the belt against the headrest, and gripping means 23 are formed on the inner sides of the legs to be pressed into the headrest. Thus, the belt and the supports hold the speaker housings securely at any selected level on the headrest.

As shown most clearly in Figures 1, 5 and 6 the belt 21 is formed by a relatively broad strap of suitable material, such as neoprene rubber which provides some elasticity as well as flexibility, and is of sufficient length to provide free end portions which can be overlapped on one side of the headrest, the rear side as shown herein. For adjustability, the overlapping portions have coupling means thereon, herein in the form of strips of interlocking hook-and-loop material that are secured to adjacent sides of the overlapping end portions.

While different sizes of belts may be provided for different applications, a presently preferred size has a thickness of the order of one-eighth of an inch, a width

of about three and one-half inches, and a length of about thirty-four inches. The hook-and-loop fasteners are strips of material attached to the belt. Preferably, the "loop" fastener strip covers the entire outer side of the belt, and the "hook" strip 24 is sewn onto one end of the belt, at 25, to form an extension of the belt with the "hook" fasteners on its inner side, as shown in FIG. 5.

Each of the speaker supports 20 is generally U-shaped in horizontal cross-section, as viewed in FIGS. 3 and 5, and is composed of a suitable flexible plastic, so that the legs 22 of the supports are movable in the manner illustrated in FIG. 3, this being a somewhat greater range of movement than is likely to be needed under normal circumstances. The greater the range of movement, however, the greater will be the versatility of the assembly for mounting on seat backs of different sizes.

As shown in FIG. 3, the gripping means 23 on the inner, concave sides of the speaker supports 20 are sets of teeth that project inwardly from the support legs 22. While these sets of teeth may take various forms, the presently preferred form is a knurled area on the inner side of each leg, forming shallow teeth for gripping the headrest without tearing the material.

The outer, convex side of each speaker support 20 preferably is smoothly curved for easy sliding engagement with the belt 21. To mount the speaker housings 17 on the supports, two hinge lugs 27 project laterally outwardly from the central portion of each support, at the top and bottom thereof, and each speaker housing has a mounting rib 28 (FIG. 2) on its inner side, the side closest to the seat back, that is straddled by the hinge lugs. A double-headed hinge pin 29 is mounted at its ends in the two hinge lugs of each support, as shown in FIG. 2, and extends through a vertical bore 30 in the mounting rib, thereby forming a hinge for the speaker housing.

Frictional resistance to turning of the housings 17 is provided in the hinges, either by clamping the lugs 27 against the ends of the ribs 28 or by providing an interference fit for the hinge pins. With such resistance, the speaker housings are held releasably in any selected angular position relative to the speaker supports, and thus relative to the head of the person seated on the seat.

As best shown in FIG. 2, the hinge pins 29 are spaced outwardly from the supports 20 to provide a gap in each speaker unit between the outer side of the support and the adjacent side of the mounting rib 28 on the speaker housing. These gaps are sized to pass the belt 21 with a close sliding fit, both vertically and laterally, thus avoiding excessive looseness in the speaker assembly, even before the assembly is mounted on a seat back. With a belt composed of material that is about one-eight of an inch thick, the gaps are made only slightly wider, and of a vertical height only slightly greater than the width of the belt. When "loop" fastening material covers the outer side of the belt, the gap is made wide enough to accommodate this material as well.

As will be apparent from the foregoing, the speaker assembly described . . may be quickly and easily installed on a selected seat back or headrest by simply placing the supports 20 over the side edges of the back or headrest at the desired level, drawing the belt tight, and securing the overlapping ends of the strap together. Preferably, the belt is slightly stretched to insure tight clamping of the supports against the seat back, and also to insure that continuing clamping pressure is maintained after installation. So mounted, the speaker assembly is connected to the vehicle sound system by the connectors, and the system is ready for use. Of course, the user can adjust the angular

positions of the speaker housings individually to the user's preferred positions.

Thus, it will be apparent that the present invention provides a relatively simple speaker assembly that is mountable in a quick and easy manner on a seat back. It also will be apparent that, while a preferred embodiment has been illustrated and described, various modifications and changes may be made by those skilled in the art without departing from the spirit and scope of the invention as defined by the appended claims.

Claims:

1. A speaker assembly mountable on an upright seat back or the like, comprising:

a pair of generally U-shaped speaker supports, each having a convex outer side and a concave inner side shaped to fit around a side edge of the seat back, including a pair of flexible arm portions for lying in front of and behind the seat back and a central portion for lying against the side of the back rest;

a pair of speaker housings, each positioned alongside one of said speaker supports and projecting outwardly in spaced relation with the convex outer side of the support, and having a speaker grille facing forwardly relative to the back rest;

a pair of hinge lugs on each of said speaker supports projecting laterally outwardly, above and below the adjacent speaker housing;

means forming a hinge between each of said speaker housings and the adjacent speaker support and pivotally mounting each speaker in laterally spaced relation with its support, forming vertically elongated gaps between the speakers and the supports;

an elongated flexible belt of substantially the same width as the vertical length of said gaps, said belt extending through said gaps to extend across the front side of the seat back, and having free end portions for overlapping on the rear side of said seat back;

coupling means for joining said free end portions together and holding said belt in tightly encircling relation with said seat back and said speaker supports, thereby to clamp said flexible arms against the seat back;

and gripping means on the inner sides of said arms for facing toward the back rest and engaging the latter when said belt is tightened, thereby to secure said speaker housings at a selected level on the back rest for angular adjustment to selected positions relative to the seat back.

2. A speaker assembly as defined in claim 1 wherein said coupling means are strips of interlocking hook-and-loop fastener material on the adjacent sides of the overlapping free end portions of said belt.

3. A speaker assembly as defined in claim 1 wherein said gripping means are sets of inwardly directed teeth on said leg portions.

4. A speaker assembly as defined in claim 3 wherein said teeth are defined by knurled areas on said leg portions.

5. A speaker assembly as defined in claim 1 wherein said speaker supports, when free, are generally semi-circular in shape.

6. A speaker assembly as defined in claim 5 wherein said speaker supports are composed of resiliently flexible plastic.

7. A speaker assembly as defined in claim 1 wherein said hinge means include hinge pins having opposite ends mounted in said lugs, said speaker housings having elongated mounting ribs extending between the lugs of the adjacent speaker support and defining an elongated through-bore receiving one of said hinge pins to mount the speaker housing pivotally between said lugs.

8. A speaker assembly as defined in claim 7 wherein said hinge means frictionally resist pivotal movement of said speaker housings relative to said speaker supports.

9. A speaker assembly mountable on an upright seat or the like, comprising:

two speaker units each comprising a speaker housing, a speaker support positionable along one side edge of the seat, and hinge means pivotally mounting each speaker housing on the support;

a flexible belt joining said speaker units together and adjustable in length to adjust the spacing of the speaker units to the width of the seat;

and gripping means on said speaker supports for cooperating with said belt to hold the speaker housings at a selected level on the seat.

10. A speaker assembly as defined in claim 9 wherein said belt has free end portions to be disposed on one side of said seat, and coupling means for adjustably coupling said free ends together.

11. A speaker assembly as defined in claim 10 wherein said coupling means are interlocking hook-and-loop fasteners on adjacent sides of said free end portions.

12. A speaker assembly as defined in claim 11 wherein one of said hook-and-loop fasteners covers the outer side of said belt, and the other of said hook-and-loop fasteners is on the inner side of a relatively short strip of material that is attached to one end of the belt to form an extension thereof.

13. A speaker assembly as defined in claim 9 wherein said speaker supports are U-shaped members composed of resiliently flexible plastic and said gripping means are teeth on the inner sides of the members for assisting in holding the speaker supports on the seat, said belt being wrapped around the outer sides of the members to press said teeth inwardly into the seat.

14. A speaker assembly as defined in claim 13 wherein said members have outwardly projecting lugs for straddling said speaker housings, said hinge means comprising hinge pins having opposite ends mounted in said lugs.

15. A speaker assembly as defined in claim 14 in which said hinge means frictionally resists movement of said speakers thereby to hold each speaker releasably in a selected angular position.

16. A speaker assembly as defined in claim 14 wherein each of said speaker housings has an elongated mounting rib extending between said lugs and formed with a through-bore through which the hinge pin extends, said mounting ribs being spaced outwardly from said speaker supports to form gaps through which said belt extends.

17. A speaker assembly substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

18. Any novel feature or combination of features described herein.

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